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I, SMILJA DRAGOSAVLJEVIC, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2002951128 for a patent by MARS INCORPORATED as filed on 23 August 2002.



WITNESS my hand this
Second day of September 2003

S. Dragosavljevic

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AUSTRALIA

Patents Act 1990

ORIGINAL

PROVISIONAL SPECIFICATION

"Method of Preserving Vegetable Quality In Packeted Pet Food"

The invention is described in the following statement:

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PRESERVATION OF DRIED VEGETABLE QUALITY IN PACKETED PET FOOD

FIELD OF THE INVENTION

5 The invention relates to the field of commercial pet food manufacture. In particular it relates to the treatment of vegetables that are components in a packeted pet food in order to prevent degradation of vegetable quality and appearance.

BACKGROUND OF THE INVENTION

10 The present trend in the design of pet foods is to provide products that have components that are strongly reminiscent of human food. One particular objective is to include high-quality dehydrated vegetable material for its 'healthy' nutritional image and for its visual appeal, ie the variety in shape and colour it adds to the product as a whole. Such vegetable material is typically blended with 15 cereal- and meat-based products and packaged in relatively moisture-resistant bags for distribution and sale.

There are two particular challenges that are presented by including such materials in a packeted pet food. Firstly, the cereal- and meat-based kibbles, that tend to provide the bulk of such products, tend to have slightly higher moisture 20 levels than the dehydrated vegetables. This leads, over time, to moisture migration from those kibbles into the vegetables. This in turn leads to discoloration of the vegetable materials via oxidation and other mechanisms, with resultant loss of visual appeal and saleability.

Secondly, pet mammals (typically felines and canines) tend not to find 25 vegetable matter, especially when dehydrated, especially intrinsically palatable. This may lead to the vegetable material being left behind in the pet's food bowl, which does not tend to be received favourably by the pet owner.

Therefore, there is a need to provide a treatment for vegetables, prior to inclusion in the pet food blend, that will both assist in preventing discolouration of 30 the vegetables and will render them relatively more palatable to the animal.

Treatment of dried vegetable matter with a 'colour-fixing' agent such as sodium metabisulfite is known in the art to help preserve natural colour over time,

especially where oxidation is the main cause of discoloration. However, simple treatment such as this will not be sufficient to overcome the added challenge of preserving colour and texture where the dried vegetable matter is included in a packet with commercial pet food kibbles.

- 5 In such cases, it is thought to be beneficial to coat the vegetable pieces with a barrier material or humectant that will prevent the ingress of moisture, oxygen and other harmful compounds.

US Patent Document No. 4,832,969, by Lioutas, lists a number of such compounds that may be used particularly for dried vegetables for human 10 consumption. This document strongly recommends the use of "low sweetness" sugars such as maltose, presumably as humans do not tend to like vegetables to taste sweet or 'sugary'. However, it is known that pet mammals do not always respond to the same flavour profiles as humans. In particular it may be suspected 15 that one of the reasons that many pet mammals do not respond well to the flavour profiles of vegetables is due to this kind of divergence with human preferences. Therefore, treatments that work well in a human food context will not necessarily be suitable in pet mammal foods.

- Therefore, it is an object of the present invention to provide vegetable material for inclusion in a pet food product that is resistant to the degradation over 20 time, to which such material is normally subjected, and which is palatable to pet mammals.

SUMMARY OF THE INVENTION

According to one aspect of the invention, there is provided a method of 25 preparing vegetable matter for inclusion in commercial packeted pet food, which includes the steps of:

- treating the vegetable material with sodium metabisulfite;
dehydrating the vegetable matter, such that its water activity will be about 0.25 – 0.40 or less;
30 coating the treated vegetable matter with humectant material;

wherein said humectant material is selected from a group consisting of: a blend of sorbitol, glucose and glycerol; a blend of vegetable oil, glucose and glycerol; animal tallow.

Preferably, the humectant is animal tallow, and is added at an amount sufficient to provide between 1% by mass and 10% by mass of the prepared vegetable material, even more preferably between 4% and 8% by mass. The animal tallow, while known to be palatable to pet mammals, has surprisingly been found to act very effectively in preventing discoloration and other deterioration of vegetable matter included in commercial packeted pet food products. Animal tallow has the added advantage of being the most cost effective of the suitable humectants, and is potentially easier to include in pet food formulations, as it is typically already available on-site at the pet food manufacturing facility. Use of animal tallow in this manner is not known in the prior art.

Beef and poultry tallow has been found to be particularly effective in this application.

Alternatively, where the selected humectant material is a blend of sorbitol, glucose and glycerol, these ingredients are delivered as an aqueous solution of a mixture of all three ingredients combined in a mass ratio of approximately 1:1:1 and is added at an amount sufficient to provide the mixture of sorbitol, glucose and glycerol at between 1% and 10% by mass of the prepared vegetable material, and more preferably between 3% and 5% by mass. The selection of the known humectants sorbitol and glucose in this formulation is especially beneficial in this application, as they are both particularly 'sweet' tasting substances, and therefore make the vegetable material significantly more palatable to pet mammals than would be the case for either untreated vegetables or for vegetables treated with other known humectants, such as are recommended in prior art documents such as US 4,832,969, discussed above.

Alternatively, good results, with respect to both preservation of vegetable quality and palatability, may be obtained where the glycerol of the above formulation is replaced with vegetable oil, for example sunflower oil.

In a particularly preferred embodiment, the vegetable matter consists of size-reduced carrots and diced green beans, although many other types of

vegetable matter, including peas, pumpkin, cabbage, tuber dehydrates and other vegetables are also suitable.

In another aspect of the invention, there is provided vegetable material prepared in accordance with any of the embodiments of the method described above.

In another aspect of the invention, there is provided a commercial packeted pet food, including vegetable material prepared in accordance with any of the embodiments of the method described above.

10 EXAMPLE – VEGETARIAN DRY DOG FOOD

Diced carrots and diced green beans (in a relative proportion of 50:50 by mass) were prepared by a method according to the invention, as outlined below.

After dicing and washing, the vegetables are blanched and then treated with sodium metabisulfite. This may be done with or without processing aids such as sodium carbonate or sodium citrate. The treated vegetables are hot air dried to desired moisture content and a water activity of approximately < 0.5, cooled, inspected and packed.

Some of the vegetables were coated in beef tallow, of the kind typically available from rendering plants. This was done by spraying the tallow on to the vegetables at a mass rate of 4% and a temperature of about 60 – 70°C. Distribution of the tallow on the surface of the vegetables was achieved by tumbling the vegetables as the spray was applied.

Some of the vegetables were coated in a blend of sorbitol, glucose and glycerol. The composition of the blend was an aqueous solution of about 3% sorbitol, 3% glucose and 3% glycerol by mass, and the final vegetable product featured sorbitol, glucose and glycerol at a combined proportion of about 4%. Application of the blend to the surface of the vegetables was done as per the beef tallow.

The remainder of the vegetable material was not coated with any humectant material.

Each of the treated and untreated vegetable mixes were then individually blended into CESAR® DUO, a petfood product marketed by the applicant, and

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which is typical of the type of pet mammal food product discussed in the background section above. The addition rate of the vegetable material was about 4% by mass. The blends underwent storage trials and palatability (feeding) tests.

During the storage trial, the treated vegetables were found to suffer no significant loss of quality when stored at 20°C, 37°C and 45°C for in excess of 8 weeks. Therefore, it is expected that the overall shelf life of the product may be increased to 2 years with treated vegetables, as opposed to only 3 months with untreated vegetables. Similar results were achieved with similar treatments using humectant blends consisting of sorbitol, glucose and glycerol, and with blends consisting of sunflower oil, glucose and glycerol.

In the feeding test, the following products were offered:

- Dry petfood kibble, as per CESAR® DUO, with untreated vegetable blend inclusion, as described above (Diet A);
- Dry petfood kibble, as per CESAR® DUO, with beef tallow treated vegetable blend inclusion, as described above (Diet B); and
- Dry petfood kibble, as per CESAR® DUO, with vegetable blend inclusion treated with glycerol/glucose/sorbitol, as described above (Diet C).

The diets were fed to a panel of dogs under controlled conditions. Briefly, the feeding protocol was as follows: a Relative Acceptance Test (RAT) was performed, based on a panel of small and toy dogs. Dogs were fed 150g per day.

Three measures were used to determine the relative palatability of the three diets:

- (a) Amount eaten (g): Mean of the amount of the product offered that was eaten in a single meal occasion;
- (b) % Ate All: The percentage of meals where all of the product that was offered was eaten; and
- (c) Enthusiasm: Mean score (on a scale of 1 to 100) of the owner's perception of the animal's enjoyment of the meal, where a higher score means the animal appeared to enjoy the meal more, and appeared to consume the meal more rapidly.

The results of the feeding test are given in Table 1. P-values given are based on a 95% confidence level.

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Table 1.

Attribute	Diet A	Diet B	Diet C	p-value
Amount Eaten (g)	63b	71a	69a	0.013
Ate All (%)	10b	16a	12ab	0.062
Enthusiasm (scale 1-100)	55b	60a	60a	0.384

The results underwent statistical analysis via an ANOVA model with post hoc comparison. The results from the above table indicate that Diets B and C
5 achieved significantly higher acceptance by the animal than that the diet including untreated carrots and beans.

DATED this 23rd day of August 2002

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